

**ERTH 309 - SEDIMENTOLOGY AND STRATIGRAPHY - SPRING 2020**  
**4 Credit Hours. DP/DY. Lecture: MWF 10:30-11:20. Lab: W 1:30-4:20.**  
**Prerequisite: ERTH 200**

**Instructor: Dr. Craig Glenn:** POST 720A; 956-2200; [glenn@soest.hawaii.edu](mailto:glenn@soest.hawaii.edu).  
 Office Hours: After class Monday or by appointment. Walk-ins also always welcome!  
**Teaching Assistant: TBA**

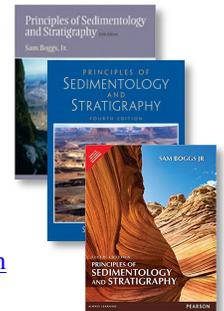
### WHY SEDIMENTOLOGY AND STRATIGRAPHY?

This course is devoted to understanding the environmental processes that form sediments and sedimentary rocks, and how we go about interpreting past environments and processes from the sedimentary record.

Sedimentology encompasses the study of modern earth surface environments and sediments and the processes that result in the deposition of sediments that each environment leaves in its wake. Sediments and sedimentary rocks cover most of Earth's surface, record much of Earth's history, and contain all of Earth's fossil record. The premise that many of the fundamental processes affecting the earth today are much like those in the past is the key basis for determining how ancient sediments formed. From modern sediment compositions, textures, sedimentary structures, fossils and geochemistry we decipher Earth's past terrestrial and marine environments, climates, ecosystems, mountain building and plate tectonics. Thus, the study of sediments and sedimentary rocks also forms the primary basis for the historical sciences of paleoclimatology, paleogeography, paleoecology, and paleoceanography. In addition, many sediment systems act as excellent archives of environmental change, allowing us a window into the recent past, as well as providing tools for monitoring change within active sedimentary environments; these in turn can be used to inform management strategies. Sedimentology is also closely linked to stratigraphy, which is the study of the physical and temporal relationships between sediments, rock layers or strata.

### MATERIALS YOU WILL USE:

- (1) **Textbook:** Sam Boggs, Jr., *Principles of Sedimentology and Stratigraphy*  
 Either 4th Ed. (2006), 5th Ed. (2012), or 5E (International Ed) are OK!  
**Not available in UH Bookstore. Buy/rent or find it online (ask Craig).**
- (2) **Supplemental Text:** Perry & Taylor 2007 *Environmental Sedimentology*, Blackwell, find it online.
- (3) Other supplemental readings posted on Laulima.
- (4) All Power Point Slides will be posted on Laulima (<https://laulima.hawaii.edu>).
- (5) **Labs:** Labs build upon and follow lectures. "Glenn's Lab Cookbooks" and other texts are provided.  
**Useful Resources:** A Glossary of Geology Terms: <https://www.webref.org/geology/geology.htm>  
 Geology and Earth Science Definitions: <https://geology.com/geology-dictionary.shtml>  
 Dictionaries of Geology, Geochemistry, Water, Mining, etc <http://www.geotech.org/dictionaries.html>  
 Glossary of Geology (5th Ed/AGI): Hard Copy Text or iPad/iPhone or Kindle, or Nook Version:  
<https://www.americangeosciences.org/pubs/glossary/#online>
- (6) **Required Supplies:** (1) A 10X (or 20X) Hand Lens!! (2) Complete set of colored pencils; (3) a Flash Drive.



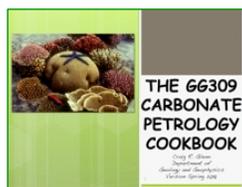
### GRADING

**ALL LABS ARE DUE BEFORE EACH NEW LAB SECTION BEGINS (LAB OVERLAPS ARE NOT ALLOWED)**

**MIDTERMS ARE SCALED BY NUMBER OF LECTURES AND LABS FOR EACH**

**ATTENDANCE IS TAKEN REGULARLY AND IS INCLUDED AS PART OF YOUR GRADE**

**COURSE GRADE: 3 MIDTERMS + QUIZZES = 65%, LABS = 30%, IN-CLASS PARTICIPATION = 5%**



**GG 309 - SEDIMENTOLOGY AND STRATIGRAPHY - SPRING, 2020**  
**4 Credit Hours. Lecture: MWF 10:30-11:20. Lab: W 1:30 - 4:20.**

**- TENTATIVE LECTURE AND LABORATORY SCHEDULE -**

Required Readings (Boggs 4th/5th)

***PART I: ENVIRONMENTS AND ENVIRONMENTAL PROCESSES***

JAN	13 (Mon)	Introduction, Discussion of the Course	
	15 (Wed)	Weathering Reactions and Soils	Boggs Ch. 1
	17 (Fri)	<b>Lab: Semester Microscope Assignments/Time Scale Quiz</b> Weathering Reactions and Soils	Boggs Ch. 1
	20 (Mon)	<b>HOLIDAY MARTIN LUTHER KING JR. DAY</b>	
	22 (Wed)	Sedimentary Textures	Boggs: Ch. 3 + Textural Maturity in Ch. 5 + Craig's Lab Manual
	24 (Fri)	<b>Lab: Sedimentary Textures</b> Particle Transport and Bedforms	Boggs Ch. 2 & 4
	27 (Mon)	Primary Sedimentary Structures	Boggs Ch. 2 & 4
	29 (Wed)	Primary Sedimentary Structures	Boggs Ch. 2 & 4
	31 (Fri)	<b>LAB: Sedimentary Structures</b> Primary Sedimentary Structures	Boggs Ch. 2 & 4
FEB	3 (Mon)	Alluvial and Fluvial Environments	Boggs Ch. 8 & Ch. 9
	5 (Wed)	Alluvial and Fluvial Environments	
	7 (Fri)	<b>Lab: Sedimentary Structures (Cont'd)</b> Marginal Marine Environments – Deltas	Boggs Ch. 9
	10 (Mon)	Marginal Marine Environments –Estuaries/Beaches	
	12 (Wed)	Beaches and Shelf Environments	Boggs Ch. 9 & Ch. 10
	14 (Fri)	<b>Lab: Siliciclastic Shelves Exercise:</b> Shelf Environments	Boggs Ch. 10
	17 (Mon)	<b>HOLIDAY - PRESIDENTS DAY</b>	
	19 (Wed)	Shelf/Deep Marine Environments	Boggs Ch. 10
	21 (Fri)	<b>Lab: Siliciclastic Shelves Exercise</b> Deep Marine Environments: Clastics	Boggs Ch. 10
	24 (Mon)	Deep Marine Environments: Clastics/Carbonate	
	26 (Wed)	Deep Marine Environments: Carbonate, Siliceous, and Red Clays	
	28 (Fri)	<b>Lab: MIDTERM REVIEW SESSION</b> <b>MIDTERM EXAM 1 ON PART I</b>	

***PART II: Rocks Can Talk: Interpreting Past Environmental Processes from the Sedimentary Record***

MAR	2 (Mon)	Introduction to Siliciclastic Rocks: QFL Classifications and Why	Boggs Ch. 5
	4 (Wed)	Siliciclastic Rocks Provenance Studies	
	6 (Fri)	<b>Lab: Sandstones Lab (w/ Thin Section Slide Show)</b> <i>Craig's Sandstone Petrology Cookbook</i> Siliciclastic Rocks	
	9 (Mon)	Carbonate Reef Systems	Boggs Ch. 11.1-11.5
	11 (Wed)	Carbonate Minerals & Carbonate Rock Classifications	Boggs Ch. 11 and 6.1-6.7
	13 (Fri)	<b>Lab: Carbonate Lab (w/ Thin Section Slide Show)</b> Carbonates	Carbonate Petrology Cookbook

***MARCH 16-20 Spring Break***

	23 (Mon)	Carbonate Diagenesis	Boggs 6.8
	25 (Wed)	<b>REQUIRED FIELD EXERCISE: 10:30 – 5:00 PM, Barbers Point Carbonate Field Trip!!!</b> <b>NOTE: If you have a class conflict be sure to get clearance from the other instructor!</b>	
	27 (Fri)	Carbonate Diagenesis	Handouts

**GG 309 - SEDIMENTOLOGY AND STRATIGRAPHY - SPRING, 2020**  
**4 Credit Hours. Lecture: MWF 10:30-11:20. Lab: W 1:30 - 4:20.**

<u>DATE</u>	<u>TOPIC</u>	<u>Required Readings (Boggs 4th/5th)</u>
APRIL 30 (Mon)	Evaporites and Evaporite Environments	Evaporites: Boggs 4th Ch. 7.1-7.2 & Ch. 11.6
1 (Wed)	Evaporites/Sabkha Dolomites (Required Movie)	Dolomites: Boggs 5 <sup>th</sup> p154-159; Boggs 4th <sup>th</sup> 182-188
	<b>Lab: Wild Cat Lab – Sed. Rock Synthesis and Interpretation</b>	
3 (Fri)	Dolomites	Dolomites: As above
6 (Mon)	Dolomites	
8 (Wed)	The Coastal Upwelling Trinity: Phosphorites, Siliceous Seds, and Black Shales	Boggs 7.3, 7.5; Glenn et al. 2003
	<b>Lab: Sed Rock Synthesis (Cont'd)</b>	
10 (Fri)	<b>HOLIDAY - GOOD FRIDAY</b>	
13 (Mon)	Coastal Upwelling Environments and Sediments	Film and Discussion
15 (Wed)	Coastal Upwelling Sediments and Oxidic/Suboxic/Anoxic Diagenesis	Berner; Froelich; Glenn
17 (Fri)	Catch Up and Midterm Review	
	<b>Lab: Chemical and Authigenic Sediments Lab</b>	
20 (Mon)	<b>MIDTERM EXAM 2 ON PART II</b>	

***PART III: PRINCIPLES OF STRATIGRAPHY***

22 (Wed)	Stratigraphy Intro and Lithostratigraphy	<i>Both: Boggs Ch 12 (Lithostrat) + Ch 15 (Chronostrat)</i>
	For Lecture and Lab ALSO READ “Chpt. 2: Stratigraphic Principles and Correlation” (on Lulima)	
24 (Fri)	Lithostratigraphy and Wireline Logging	Boggs Ch. 12 and Ch. 15
	<b>Lab: Time Scale Quiz and Exercise in Physical Stratigraphy &amp; Correlation</b>	
27 (Mon)	Biostratigraphy	Boggs 12 + 14 (Biostrat) + 15
29 (Wed)	Magneto-stratigraphy /Oxygen Isotopes	Boggs Ch. 13 and Ch. 15
	<b>Lab: Stable Isotope Lab Tour and Finish Exercise in Physical Stratigraphy &amp; Correlation</b>	
MAY 1 (Fri)	Oxygen Isotopes, Milankovitch Cycles and Cyclo-mania	Boggs Ch. 12.4 and Ch 15
4 (Mon)	Sequence Stratigraphy and Sea Level Change: How to build a Continental Margin	Boggs Ch. 13 + Handouts
6 (Wed)	Sequence Stratigraphy and Sea Level Change	
	<b>Lab: Sequence Stratigraphy Practicum and Review Session for Final Exam</b>	
MAY 15 (FRI)	<b>FINAL EXAM (= EXAM 3 ON PART III). POST 703, 9:45-11:45 a.m.</b>	

**LEARNING OBJECTIVES, DISABILITY ACCESS, AND TITLE X**

**DEPARTMENT LEARNING OBJECTIVES:**

The Department of Earth Sciences has five overall Student Learning Objectives (SLOs) related to the BA and BS degrees. This course's objectives encompass three levels of maturity in all five of these categories:

- Students can explain the relevance of geology and geophysics to human needs, including those appropriate to Hawaii, and be able to discuss issues related to geology and its impact on society and planet Earth.
- Students can apply technical knowledge of relevant computer applications, laboratory methods, field methods, and the supporting disciplines (math, physics, chemistry, biology) to solve real-world problems in geology and geophysics.
- Students use the scientific method to define, critically analyze, and solve a problem in earth science.
- Students can reconstruct, clearly and ethically, geological knowledge in both oral presentations and written reports.
- Students can evaluate, interpret, and summarize the basic principles of geology and geophysics, including the fundamental tenets of the sub-disciplines, and their context in relationship to other core sciences, to explain complex phenomena in geology and geophysics.

**DISABILITY ACCESS:**

If you have a disability and related access needs the Department will make every effort to assist and support you. For confidential services students are encouraged to contact the Office for Students with Disabilities (known as “Kokua”) located

**GG 309 - SEDIMENTOLOGY AND STRATIGRAPHY - SPRING, 2020**  
**4 Credit Hours. Lecture: MWF 10:30-11:20. Lab: W 1:30 - 4:20.**

on the ground floor (Room 013) of the Queen Lili'uokalani Center for Student Services: KOKUA Program; 2600 Campus Road; Honolulu, Hawaii 96822 Voice: 956-7511; Email: kokua@hawaii.edu; URL: [www.hawaii.edu/kokua](http://www.hawaii.edu/kokua)

**TITLE IX:**

The University of Hawai'i is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. If you or someone you know is experiencing any of these, the University has staff and resources on your campus to support and assist you. Staff can also direct you to resources that are in the community. Here are some of your options:

As members of the University faculty, your instructors are required to immediately report any incident of potential sex discrimination or gender-based violence to the campus Title IX Coordinator. Although the Title IX Coordinator and your instructors cannot guarantee confidentiality, you will still have options about how your case will be handled. Our goal is to make sure you are aware of the range of options available to you and have access to the resources and support you need.

If you wish to remain ANONYMOUS, speak with someone CONFIDENTIALLY, or would like to receive information and support in a CONFIDENTIAL setting, use the confidential resources available here:  
<http://www.manoa.hawaii.edu/titleix/resources.html#confidential>

If you wish to directly REPORT an incident of sex discrimination or gender-based violence including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence or stalking as well as receive information and support, contact: Dee Uwono Title IX Coordinator (808) 956-2299 [t9uhm@hawaii.edu](mailto:t9uhm@hawaii.edu).